Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/2

PAPER 2

Friday **10 NOVEMBER 2000** Morning 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic calculator and/or Mathematical tables
Ruler (30 cm)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1 kg to be 10 N (i.e. acceleration of free fall = 10 m/s^2).

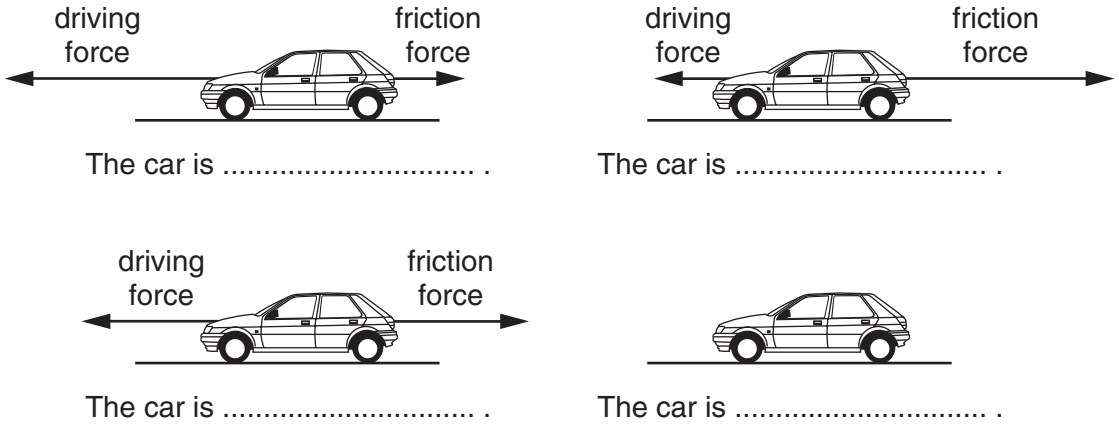
FOR EXAMINER'S USE

This question paper consists of 16 printed pages.

[Turn over

1 Moving cars always experience friction. A driver goes on a short journey in a car.

Fig. 1.1 shows the car at four places during the journey. The arrows represent the size and direction of the horizontal forces on the car.



The car is ..... .

The car is ..... .

The car is ..... .

The car is ..... .

Fig. 1.1

On the line underneath each picture, state whether the car is

at rest,

speeding up,

going at steady speed,

slowing down. [4]

2 **(a)** Fig. 2.1 shows three types of water tap (faucet).

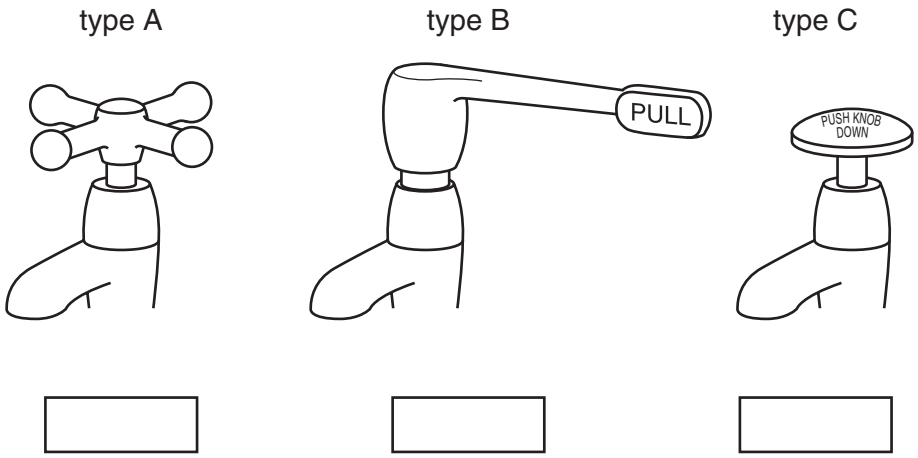


Fig. 2.1

In the box underneath each tap, write YES if a person would need to cause a moment on the handle in order to make the water flow, or NO if the person would not need to cause a moment. [3]

(b) A old person has taps of type A in the kitchen. The person has difficulty operating the tap. What could be done to make it easier to operate the tap?

.....[1]

[Turn over

3 **(a)** Fig. 3.1 shows the speed/time graph for a motorcycle.

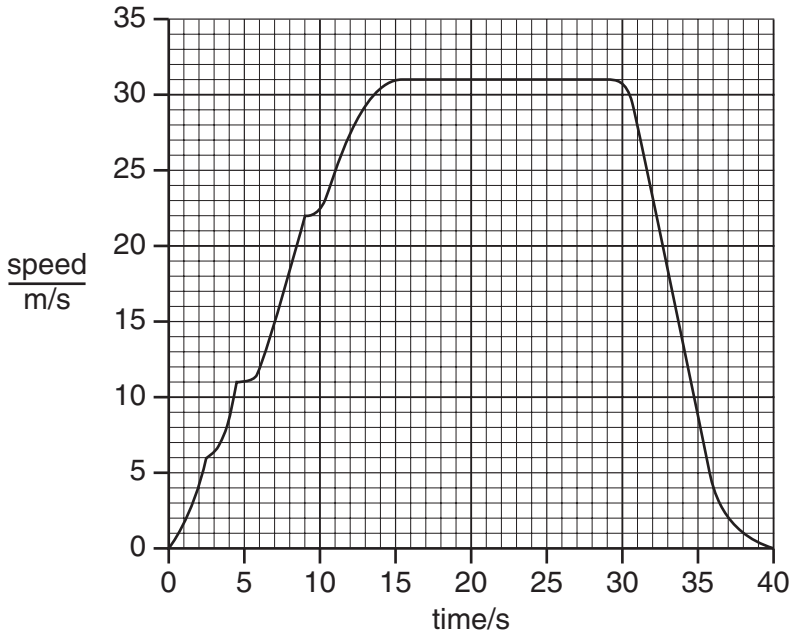


Fig. 3.1

(i) What is the maximum speed of the motorcycle? ..... m/s

(ii) Whilst accelerating, the motorcycle changes gear three times.

State **one** of the speeds at which the gear is changed. ..... m/s

(iii) For how long is the motorcycle slowing down? ..... s

[3]

(b) On another occasion, the motorcycle is made to increase its speed at a constant rate for 10 s. The speed/time graph for this is shown in Fig. 3.2.

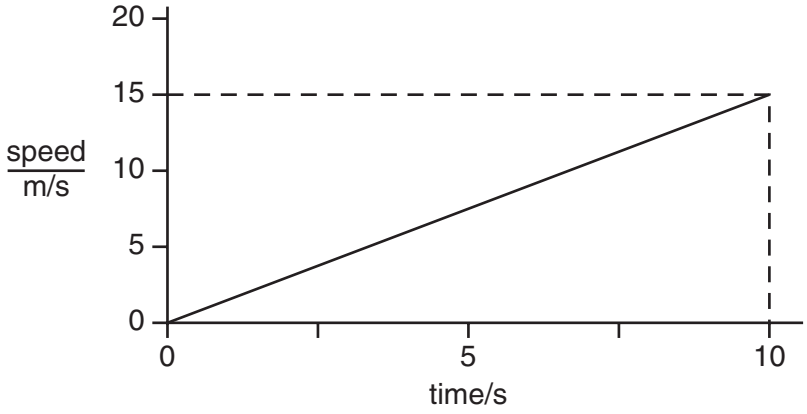


Fig. 3.2

How far does the motorcycle travel in these 10 s?

distance travelled = ... m [3]

4 **(a)** Some students are asked to write down what they know about evaporation of a liquid. Here are their statements, some of which are correct and some incorrect.

Put a tick alongside those statements which are correct.

A "Evaporation occurs at any temperature." ☐

B "Evaporation only occurs at the boiling point." ☐

C "Evaporation occurs where the liquid touches the bottom of the container." ☐

D "Evaporation occurs at the surface of the liquid." ☐

E "It is the higher energy molecules which escape." ☐

F "The molecules gain energy as they escape." ☐

G "The liquid temperature **always** rises when evaporation occurs." ☐

H "Rapid evaporation produces cooling." ☐

[4]

(b) Sometimes after shaving, men splash a liquid, called an aftershave, over their faces. This makes their faces feel fresher as the aftershave evaporates.

(i) Which of the statements in part **(a)** explains why the aftershave, even though it is at room temperature, cools the skin.

statement .....

(ii) Suggest why the aftershave cools the skin better than water at room temperature.

.....

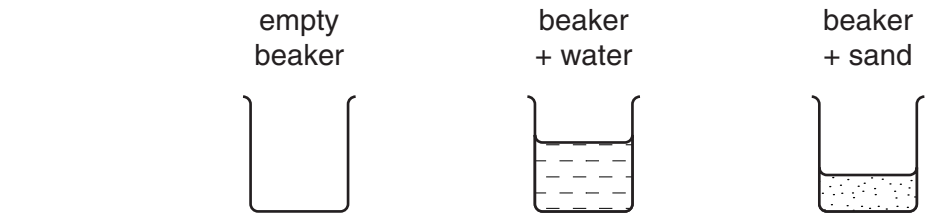
.....

[2]

5 **(a)** Complete the following sentence.

"The temperature of a body rises when the ..... energy of its molecules is increased." [1]

(b) Fig. 5.1 gives details about an empty beaker and the same beaker with different substances in it.



	empty beaker	beaker + water	beaker + sand
mass	250 g	500 g	500 g
energy needed to raise temperature by 1°C	125 J	1175 J	325 J

Fig. 5.1

(i) Which of the arrangements has the highest thermal capacity?

.....

(ii) 1. What is the mass of the water? ..... g

2. What is the mass of the sand? ..... g

3. How much energy is needed to raise the temperature of

the water by 1°C? ..... J

4. How much energy is needed to raise the temperature of

the sand by 1°C? ..... J

5. Use your answers above to suggest why, on a sunny day, the temperature of the sand on a beach rises faster than the temperature of the sea.

.....

.....

.....[6]

6 Fig. 6.1 shows a view from above of a vertical mirror. A small lamp is placed at the point marked L.

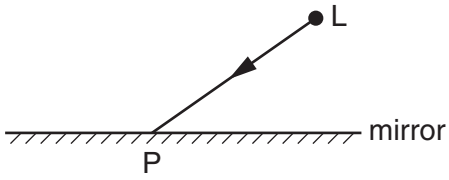


Fig. 6.1

(a) One ray, LP, from the lamp has been drawn.

(i) At P, draw and label the normal to the mirror.

(ii) At P, draw and label the reflected ray.

(iii) Mark, using an X for each, two angles which are equal.

[3]

(b) Carefully mark, using a clear dot, the position of the image of the lamp. [1]

(c) If you were looking into the mirror from point L, you might see something like Fig. 6.2 "looking back at you". (Apologies if you are better-looking than this!)

Fig. 6.2

(i) Mark clearly with the letter **R**, the image of your right ear.

(ii) Your nose is 30 cm from the mirror.
How far from your nose is its image? .....

[2]

7 **(a)** A ray of red light passes through a glass prism, as shown in Fig. 7.1.

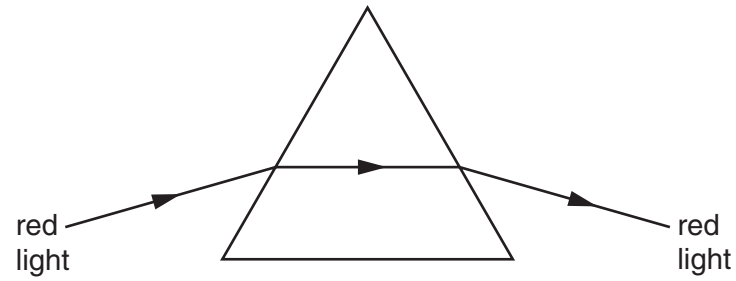


Fig. 7.1

What name do we use for the change of direction of the ray as it enters the glass?

.....[1]

(b) Fig. 7.2 shows the same prism, with white light passing through it.
The path of red light is shown.

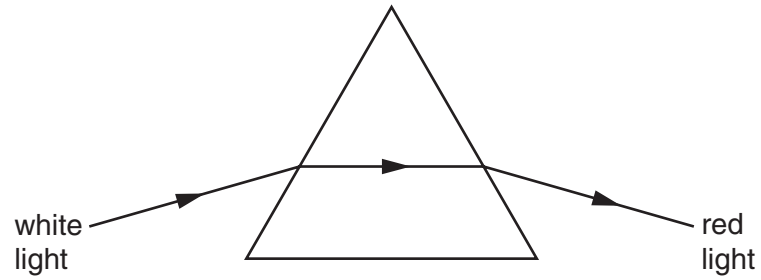


Fig. 7.2

(i) On Fig. 7.2, draw a possible path for blue light.

(ii) Something else is happening to the white light, in addition to what is shown in Fig. 7.1.

What name do we use for this? .....
[5]

(c) Light from the Sun is now passed through the prism. The path of red light is shown in Fig. 7.3.

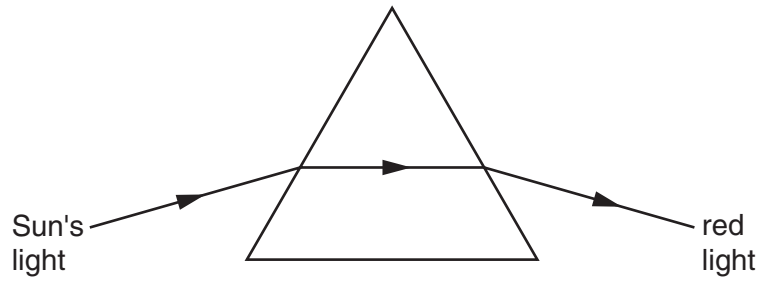


Fig. 7.3

We can detect infra-red rays using a thermocouple. On Fig. 7.3, mark with the letter **T** a position where the thermocouple could detect the infra-red rays after they have passed through the prism. [1]

[Turn over

8 Here are the approximate densities of some metals.

platinum	21 000 kg/m^3	(21 g/cm^3)
gold	19 000 kg/m^3	(19 g/cm^3)
lead	11 000 kg/m^3	(11 g/cm^3)
brass	9 000 kg/m^3	(9 g/cm^3)
iron	8 000 kg/m^3	(8 g/cm^3)
aluminium	3 000 kg/m^3	(3 g/cm^3)

A person sees a coin offered for sale in an antiques market.

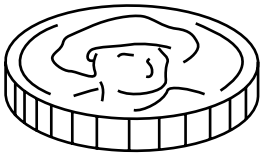


Fig. 8.1

The market trader says that the coin is made of gold. After buying the coin, the person finds that its volume is 1.4 cm^3 and its mass is 12.6 g.

(a) Write down the equation which enables you to calculate density.

[1]

(b) Calculate the density of the metal from which the coin is made.

density = ... g/cm^3 [2]

(c) Is the coin made of gold? YES/NO [1]

(d) If not, use the list above to suggest what it might be made from.

The coin might be made from ..... .[1]

(e) If a country wanted to keep its coinage the same but of as low a mass as possible, which of the metals in the list should it choose?

.....[1]

9 The circuit in Fig. 9.1 is connected up.

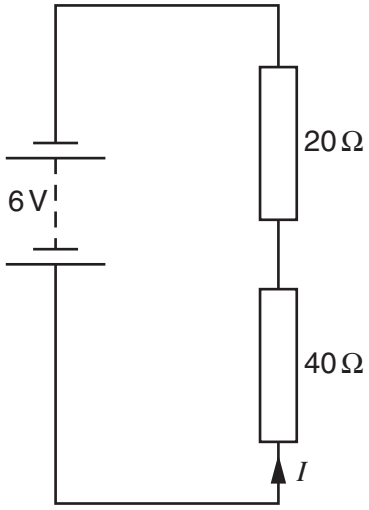


Fig. 9.1

(a) Calculate the combined resistance of the two resistors in Fig. 9.1.

combined resistance = ... Ω [2]

(b) (i) State the relationship between resistance, p.d. and current by completing the following equation.

resistance = ——————————

(ii) Calculate the current, I, in Fig. 9.1. State the unit in your answer.

current = ...
[5]

(c) Use your answer to **(b)(ii)** to calculate the p.d. across the 40 Ω resistor.
State the unit in your answer.

p.d. = ... [3]

(d) The circuit is now used as a potential divider, as shown in Fig. 9.2.

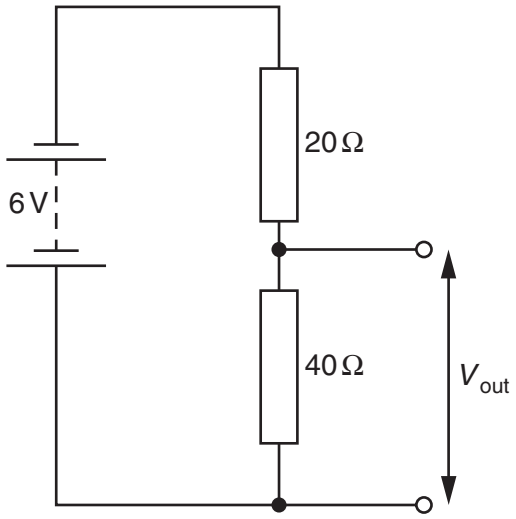


Fig. 9.2

Use your answer to **(c)** to state the value of V_{out} , the output voltage of the potential divider.

V_{out} = ... V [1]

10 (a) Fig. 10.1 shows a view from above of a person standing at the edge of a pond, dipping the end of a stick up and down in the water.
Some of the wavefronts that spread out are shown.

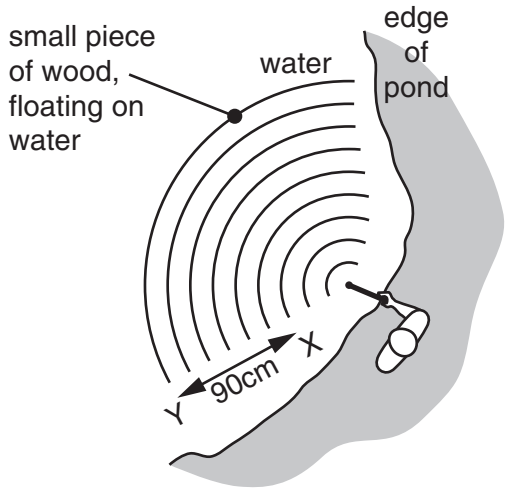


Fig. 10.1

(i) How many wavelengths are there between X and Y? .....[1]

(ii) The distance from X to Y is 90 cm. Calculate the wavelength of the waves.

wavelength = ... cm [2]

(iii) The speed of the waves is affected by the depth of the water.

1. Describe the shape of the wavefronts, as seen from above.

   .....

2. What does the shape of the wavefronts tell you about the depth of the pond?

   Give a reason for your answer.

   .....

   .....
   [3]

[Turn over

(iv) Fig. 10.2 shows a sideways view of the water surface just before the first wave reaches the floating piece of wood.

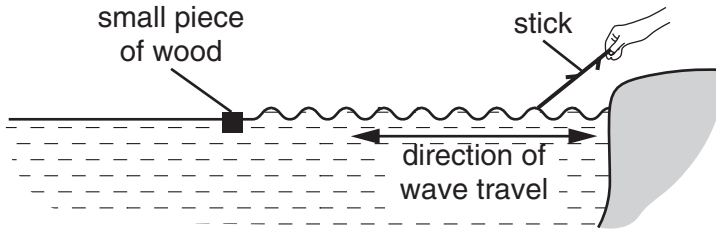


Fig. 10.2

Describe how the piece of wood moves after the waves reach it.
You may draw on Fig. 10.2 if it helps you to answer the question.

.....

.....[2]

(b) An underwater loudspeaker, placed in the pond in part **(a)**, sends out sound waves through the water, as shown in Fig. 10.3.

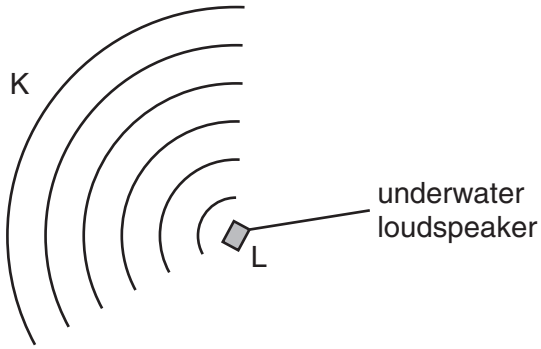


Fig. 10.3

(i) What is the difference between the nature of these sound waves and the water waves in **(a)**? Write the appropriate words in the gaps in the following sentences.

"Water waves are ..... waves."

"Sound waves are ..... waves." [2]

(ii) Fig. 10.4 shows a sideways view along the line KL.

Fig. 10.4

The dot labelled M represents a water molecule on the line KL.
Describe how the molecule moves when the loudspeaker is working.
You may draw on Fig. 10.4 if it helps you to answer the question.

.....

.....[2]

11 (a) (i) Copper is an electrical conductor. What is meant by a *conductor*?

.....

(ii) Ebonite, glass and polythene are electrical insulators. What is meant by an *insulator*?

.....

[2]

(b) Polythene is easily given a negative charge by rubbing it with a dry woollen cloth.

(i) Fig. 11.1 shows a charged polythene rod being held close to a suspended charged polythene rod.

Complete the phrase,

"like charges .....".

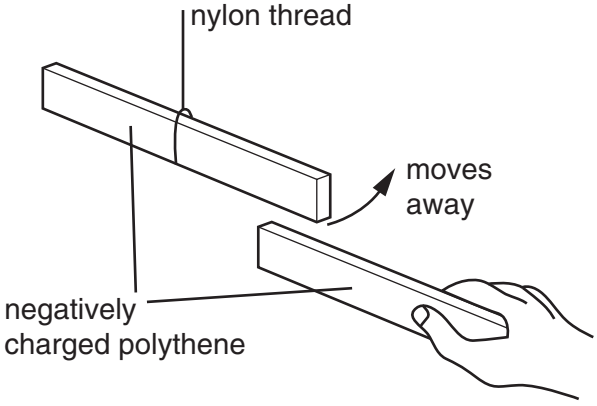


Fig. 11.1

(ii) Fig.11.2 shows rod X being held near the suspended charged polythene rod.

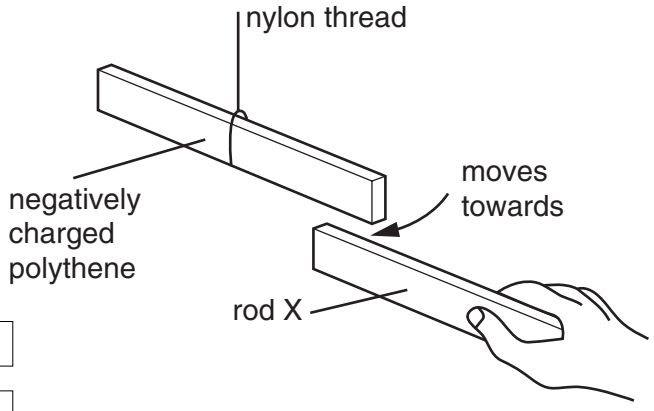


Fig. 11.2

Tick **any** of the following which might correctly describe rod X.

positively charged glass ☐

negatively charged ebonite ☐

uncharged copper ☐

negatively charged polythene ☐

[3]

12 **(a)** One nuclide is written as $^{210}_{84}\text{Po}$.

(i) Which figure is the proton number (atomic number)? .....

(ii) Which figure is the nucleon number (mass number)? .....

(iii) Which figure gives the number of protons in the nucleus? .....

(iv) How can you find the number of neutrons in the nucleus?

.....

[4]

(b) An α-particle can be written as $^{4}_{2}\alpha$.

Polonium $^{210}_{84}\text{Po}$ decays into lead (Pb) by emitting an α-particle.

Complete the nuclear equation below, by writing the correct numbers in the boxes.

$$^{210}_{84}\text{Po} \longrightarrow \begin{array}{|c|}\hline \\ \hline \\ \hline \end{array}\ \text{Pb} + {}^{4}_{2}\alpha$$

[2]